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# SOCIETY OF ARTS.

**FRIDAY, SEPTEMBER 9th, 1853.**

## MEETING OF COUNCIL.

*Wednesday, Sept. 7th,* 1853.

At a Meeting of Council held on the 7th instant, the following Institution was taken into Union:

288. Andover, Library and Institute.

## NOTICE TO INSTITUTIONS.

The Council has much pleasure in giving notice to the Institutions in Union that the undermentioned Publishers of Books and Maps,—among whom are a large number of the most eminent firms of the United Kingdom,—have agreed to supply their publications, at reduced prices, to the Society of Arts, for the use exclusively of the Institutions in Union.

The Council will shortly forward to each of the Institutions in Union a circular, setting forth the respective rates of reduction, varying from 25 to 50 per cent. (averaging nearly 40 per cent.), which the several Publishers have agreed to allow; and also the conditions, and modes of proceeding, to be observed by the Institutions, in order to avail themselves of the advantages thus offered for the purchase of Books and Maps at considerably reduced prices.

List of Publishers who have agreed to supply to the Society of Arts, at reduced rates, Books and Maps for the Institutions in Union with this Society:

Bailliere, H.
Baldwin, R.
Bell, G.
Bentley, Richard.
Bentley, Joseph.
Betts, J.
Bickers and Bush.
Black and Co.
Blackwood and Sons.
Bohn, H. G.
Bosworth, T.
Bogue, D.
Cash, W. and F. G.
Cassell, J.
Chapman, J.
Churton, E.
Churchill, J.
Clark, T. and T.
Collins, H. G.
Collins, W.
Constable and Co.
Cornwell, J.
Cradock and Co.
Crossley.
Crutchley, G. F.
Darton and Co.
Fullarton, A., and Co.
French, W.
Groombridge and Sons.
Gilbert.
Hamilton, W.
Hamilton, Adams, and Co.
Hatchard, T.
Hogg, J.
Hope and Co.
Home and Colonial School Society.
Hughes, W.
Hurst and Blackett.
Ingram and Cooke.
Johnston, W. and A. K.
Longman and Co.
Macclesfield, M.
McMillan and Co.
Masters, J.
Moxon, E. C.
Mozley, J. and Co.
Murray, John.
National Society.
Newby, T. C.
Nisbet and Co.
Oliver and Boyd.
Pamplin, W.
Parker, J. H.
Partridge and Oakey.
Pickering, W.
Religious Tract Society.
Redfern, J.
Ridgway, J.
Rivingtons.
Saunders and Ottley.
Scott, Adam.
Sporr, E. and F. N.
Sullivan, R.
Sutherland and Knox.
Virtue and Co.
Whyte, W., and Co.
Williams, J.
Wyld, J.

A List of Publishers of Music, who have agreed to allow similar reductions, will shortly be published.

## CHINA-STONE AND CHINA-CLAYS OF CORNWALL.

*An Essay on the China-stone and China-clays of Cornwall, with a description of some Mechanical Improvements in the mode of preparation of the latter.*

BY MR. H. M. STOKER, OF ST. AUSTELL, CORNWALL.

From the Twentieth Annual Report of the Royal Cornwall Polytechnic Society.

*(Continued from page* 501.*)*

### PART II.

The China-clay or kaolin of Cornwall was first brought into notice at a very late period, though the material itself has been long used; in fact, not only were the Chinese well acquainted with it, both in a raw and a manufactured state, from the most remote ages, but it is also probable, from the interesting evidences lately brought to light through the industrious exertions of Mr. Layard, and from other sources, that the Egyptians knew somewhat of its uses.

When obtained by Mr. Cookworthy, in 1768, from the Lescrowse and Trethose clay-works, in the parish of St. Stephens, a large supply was at once demanded for the Staffordshire potteries, which has gradually increased till the present time; the average annual export of last year, which I have been enabled to offer my readers through the kindness of the most influential shipping-agents in the neighbourhood, is as follows:

| | | |
|---|---|---|
| At Charlestown . . . | 40,000 | tons of China-clay. |
| „ Par . . . . . . | 10,000 | „ „ |
| „ Pentewan . . . . | 18,000 | „ „ |
| „ other harbours . . | 12,000 | „ „ |

Forming a total of 80,000 tons.

From the little attention paid to former exports of this article, I have been unable to form an accurate estimation of them, though some idea of the increase may be gleaned from the following estimates of the value of the exports of the manufactured article, to the various countries with which England has any commercial relations;

| | | |
|---|---|---|
| Shipped from Stafford in | 1835 . . . | £280,000 |
| „ „ | 1837 . . . | 560,000 |
| „ „ | 1841 . . . | 600,759 |
| „ „ | 1851 . . . | 1,210,000 |

while adding to this the exports from Derby, Worcester, and other potteries, will give a total of £2,150,000 shipped during the past year; in addition to which, of late years, a considerable amount of crude kaolin has been exported to every pottery on the Continent, and also to those of our inquiring American brethren, while a small portion has been used for bleaching.

Kaolin is found intermixed with quartz and scales of mica, in most valleys contiguous to the decomposing hills of the primary strata of our county, and is not, as far as is at present known with regard to China stone, confined to any particular district, being now obtained or obtainable, though of different qualities, on the south-western sides of either of the granite districts; yet, of course, poorest near those beds of China-stone which I before described as free from most deteriorating substances, as in the parish of St. Stephens.

It exists in these beds or stopes, as they are designated, as an amorphous whitish-blue opaque powder; which from the softening influence and rainy character of the south-westerly winds, are most frequent in valleys situated on the same aspect; often lying on the contiguous borders of the granite and killas, clay-slate, grawacke or transition strata, by which this is surrounded; where, being exposed to the action of lodes and co-existing springs, on the occurrence of the slightest convulsion, it has slid to the adjacent valleys, where its presence is indicated by the generally smooth and flattened appearance of the surface; by the vegetation on it, which is often luxuriant, especially if the clay contain an excess of potash; and by the number of springs to which it gives rise in the immediate vicinity, their height above the level of the sea being necessarily limited by that of the valleys in which the clay is deposited.

The character of the clay very much assimilates to that of the granites from which it has been formed by the disintegrating process to which I referred while speaking of the formation of China-stone, not only as to the quantity obtainable from a given amount of clay stope, but also as to the purity of the article and its whiteness, the whitest clay being formed from that granite which has the whitest felspar, and is most free from iron, the presence of this giving the manufactured wares an appearance termed "foxy;" while lastly, the amount of mica scales, which give to them their tenacity or strength of body, considerably influence the character and value of the clay; so that, as a general rule, we can form a very good diagnosis of the character of the clay by an examination of the granite from which it has been formed; and in doing this I would advise the use of a good microscope, by which only the clay producer can hope to obtain an accurate knowledge of the value and purity of our clays.

In the model which I have sent for the inspection of the Committee of the Royal Cornwall Polytechnic Society, I have employed drainage as an additional means of aiding the drying of clay, by forming a kind of filter of the clay-pan. A substratum of large pebbles, increasing in depth from behind forwards, but with the surface level, is first laid down above this coarse gravel; between which and the clay to be dried is a thin layer of fine sand; through this the water quickly runs to the corner, towards which the inclined bottom is made to fleet, which communicates with the country by means of a launder, over the inner end of which is placed a wire gauze grating. By the employment of these, from experiments I have made, I have ascertained that the clay can be dried thrice as rapidly as by the ordinary methods; in addition to the introduction of which I should recommend to the notice of parties employed in these operations the propriety of placing these pans as closely together as possible, so that on the occurrence of heavy showers, of long duration, or in the heavy dews of the nights of summer, the clay may be kept from this accession of moisture by some cheap covering, as these obstacles very much increase the difficulty of drying clay in any given period.

The kaolin is by this means only partially deprived of moisture, in order to effect the complete removal of which it is taken from the pans, where it has been allowed to remain for from three to four months, to the drying-grounds, on the adjoining hills, in summer, in cubic blocks about one foot square. In order to effect its removal from the pans, a number of parallel incisions are made the whole length of the pan, in one direction, by means of a perpendicular knife attached at right angles to a long handle; these long blocks are then divided transversely by men, who, with spades, throw them on a board, on which they are carried by women and boys to the sandy drying-yard, where they soon become perfectly dry and white; but as this can only be done in summer, and not even then if a wet season, it has become necessary that recourse should be had to other means: those hitherto employed have all required the use of a fuel obtainable only from Newport or some distant coal tract, and hence requiring considerable outlay; so much so, in fact, that but few persons are able or willing to make use of it; the heat in these cases is applied by means of a large kiln, or by passing the clay over a heated drum, neither of which methods could be made available in the return of several thousand tons of clay annually.

But it occurred to me that the deleterious floods of the winter, or the wind on the adjoining hill, might be rendered available as a motor power, provided it could be employed in the construction of a kaolin drying-machine. The success of my attempts will be best learned by a few turns of the handle of the accompanying model, made and invented by the author; by a machine twelve times the size of the model, two tons of clay can be dried completely every five minutes: it consists of a number of perforated fans, having on them shelves similarly peforated, or made of wire gauze, which are kept rotating 200 times a minute, or faster, if necessary, by the four attached multiplying-wheels. These wheel-fans have six perpendicular screw-like arms, on each of which are a number of transverse shelves for the carriage of the clay, where, from the rapid motion of the wheel, and the proposed currents of air it causes to be thrown against the clay, it rapidly becomes dry.

The fact of doing away altogether with fuel, and the substitution of a power which can be obtained with the greatest ease, on the occurrence of a very rainy season, render it at once a cheap and advantageous substitute, either for the labour at present employed or for the still more expensive fuel.

The junks of clay, after being again collected, are now piled away in sheds, under a number of thatched gates or reeders; or are placed in some sheltered spot, so that they may, nevertheless, have a constant current of cold dry air surrounding them, and be at the same time kept from rain. When required for exportation, these square blocks are scraped by a number of the clay women, who, armed with their "Dutch Hoe"-like instruments, as they surround their scraping-tables, present a rather formidable appearance; after this the clay is piled in wagons to be sent from one of the nearest ports, or is packed in a number of small casks, each capable of holding about half a ton, in which it is sent off.

The prices of these clays vary very much with the quality of the article, though those of a superior stamp seldom alter, as they have held their price for the last ten or fifteen years, and always command an excellent sale in the market at from 36*s*. to 46*s*. per ton; while those of an inferior quality may be procured at any price below this down to 17*s*. per ton; varying with their purity, hardness after calcination, degree of whiteness, both in and out of water; and lastly, the degree of shrinking they undergo on calcination or fusion.

Having already entered, as fully as the limits of the present essay will permit me, on the subject of the uses of kaolin, further information on that head must be dispensed with; but before concluding, I must introduce to your notice a few facts, bearing directly on the influence the preparation and production of this article exercises on this, the central portion of the county. The first and most important of which is the number of people employed in its preparation, and the amount of capital expended annually in labour; next, I shall show the amount of the cost of land dues; thirdly, that of land carriage, which will necessarily afford additional aid to the labourers in the vicinity, as the whole of this work is executed by a number of small farmers, each of whom is generally provided with his wagon and team of from three to four horses. The cost of cooperage and quay dues is next on the list, forming a total of 240,500*l*. spent in the preparation and production of this article in this county alone; but it should also be recollected that no less than 80,000 labourers are employed in the neighbourhood of the Staffordshire potteries, and 20,000 more in those of Derby, Worcester, Wales, and Bristol, in its subsequent manufacture; for which, prior to its arrival in or at either of these districts, a sum of 12*s*. per ton, for carriage by sea and canal, is entailed; forming a total of about 300,000*l*. spent on China-clay and stone before they arrive in the potteries, where an immense amount of capital is again spent in their manufacture.

| | Yearly Expenditure. |
|---|---|
| Labour, 7,200 men, women, and children, at 1*s*. 6*d*. per diem | £197,100 |
| Carriage of clay and stone to one of the nearest ports, at average price | 22,000 |
| Dues to landowner | 14,000 |
| Dues to proprietors of harbours | 2,500 |
| Cooperage on best clays | 5,000 |
| | £240,600 |
| Land and canal carriage, at 12*s*. per ton | 58,800 |
| | £299,400 |

Having thus, as briefly as possible, stated the chief facts with which I am acquainted relative to the history, preparation, and commercial importance of these articles, and pointed out the advantages to be derived, and the field of improvement which is offered for the contemplation, study, and enterprise of Englishmen, by substituting machinery for the great amount of manual labour and cost, at present necessarily entailed by the existing want of information on this subject, I must conclude by again calling attention to the distance of these beds from the potteries and their surrounding beds of fuel, and suggesting that substitution of the transfer of materials, at a subsequent period, may considerably alter the present state of the central portion of the county, and with it the price of the various articles of pottery, so necessary to our comfort and convenience.

The kaolin of both Devon and Derbyshire is of good working quality, but can by no means compare with that of our county, either for whiteness or strength; it contains 60 of alumina, 20 of silica, and 20 of potash (Wedgwood); and to this peculiarity of constitution (excess of silica) is due its property of being infusible and unchanged, at the highest temperature. It is extremely tenacious of moisture, and hence one great difficulty in its preparation: to be hereafter discussed.

The clay-beds, or stopes, are formed by small irregular crystals of quartz, the edges of which are by no means so well marked as in the granite, nor is their opacity so great: the mica is apparently unchanged, consisting of silicic acid, potash, and alumina, in the form of double silicate; while the felspar of the granite or China-stone, by the loss of its potash, has become converted into the amorphous powder I have just described; a singular instance of the effect of slight natural chemical changes giving rise to the formation of two such dissimilar bodies, when fused, as biscuit China, white, glassy, sonorous, and translucent; when, if the disintegrating process have but just overstepped this limit, we find, on fusion, a brick-like mass, white, opaque, adherent to the tongue, tenacious of moisture, and earthy on fracture. There are, however, as I before stated, many and varied intermediate productions from the pasty pipe-clay or tile to porcelain or glass, which is but another form of a fusible silicate. The clay stopes are oftentimes rendered useless by the presence of some iron lode, which causes them to become loosened in texture and reddened; the stope is then termed "brawny," and this has to be thrown aside as useless.

Having thus briefly given a general outline of the nature, composition, and history of these clays, I shall proceed to the notice of the mode of preparation of them in this county, which, though simple in theory, requires much care and attention in its execution, and consists essentially in the separation of the quartz from the mica and kaolin, and the subsequent collection of the latter. The execution of this process in any of the extensive works in St. Stephen's parish, one of which would cover from ten to thirteen acres of ground, and from which 2,000 to 3,000 tons are annually raised and fitted for the market, forms a curious and interesting spectacle of whitewashed happy industry for the contemplation of the traveller during the months of summer.

Distant from five to eight miles from St. Austell, situated in the centre of barren, rugged, heathery wilds, enclosed by stone walls, and bounded on every side by cold, bleak, and rugged hills, these works have a very picturesque appearance. In one part of them may be seen from thirty to forty men, boys, and women, who, with their white bonnets, white aprons, and sleeves, carry the still whiter clay, in large junks, to the surrounding hills or drying-grounds, to be exposed to the warm rays of the sun, the dry winds, and the bleaching power of the air. In another may be seen other parties scraping the clay prior to its being packed in casks, to be sent to various parts of the Old and New World; circular or oval pits and square pans are lying in all directions, their continuity here and there disturbed by one or two water-wheels in incessant motion, or piles of dried clay covered with reeders or lying in sheds; while at one extremity of the work may be seen a number of men and boys employed in excavating the clay stope, removing the overburden, or shearing the stope to wash away its clay; the sand at the same time being removed to the drying-ground by means of a tram-road, the wagons passing along which are worked by the aid of water power; while over-head launders, attached to pumps for various purposes, seem to form a skeleton roof to the whole.

The beds of clay stope are exposed by the removal of the over-burden, which varies in thickness, in some places lying but a few feet from the surface; while in others the only bed fit to be washed is placed at a depth of from ten to twenty fathoms from the surface. The removal of the superimposed earth is effected by a number of men with their pickaxes and shovels, which, by their barrows, they transport to the adjacent rugged country, so as to render it smooth and level, in order to form drying-fields for the summer. While this is in progress, the clay stope, over the top of which flows a small stream of water, is being excavated by another set of men, which, as the water passes through, has the clay suspended in it by the treading action to which the stope is subjected by means of the large boots, often seven pounds weight, with which the clay streamers are supplied; the sand is thus separated from the clay and mica, which are carried on by the water, and the sand is then carried by rail or carted to the top of the work, whence it is taken to be spread over the drying-grounds, or is thrown into the pits and pans.

The water to be supplied to the clay stope should consist of two-thirds of spring to one-third of rain-water, this mixture causing a deposit of the suspended clay much more readily than any other. Great attention is often necessary in this part of the process, as from an excess of rain-water it is often requisite that it should be saturated with some earthy base. Common alum is at present used for this purpose; though any other cheaper salt would answer the purpose, as it is only necessary to saturate the water fully with earthy bases, when the clay speedily becomes thrown down—a law not generally known.

As a substitute for this, I have at times had recourse to finely-ground peat, or wood charcoal, which, thrown over the surface of a pit, on which it floats, by a process of angular attraction and repulsion, causes the clay to be deposited, even from distilled water, far more readily than by the addition of any soluble earths—as may be demonstrated with ease by experiment in two or three tumblers; but as I am rather in advance of the water in which I left the clay and mica suspended at the bottom level of the clay-work, I must return thither, till by the aid of wooden or iron pumps, from forty to eighty feet deep, worked by a powerful water-wheel, this milky-looking fluid is elevated to the level of the large mica launders, where the clay, being lighter than it, leaves it deposited in these inclined pits, which are generally three or four in number, placed in tiers, with a slight elevation at the upper end of each. They vary in length from ten to twenty feet, are generally three feet in breadth, and six or nine inches deep, though both the number, size, and degree of inclination vary with the size and rapidity of flow of the shear of water, though no less than with the amount of mica contained in the stope. In some clay-works, the shear is so large that most of the mica is carried on with the clay, so that it possesses when fused a greater degree of tenacity, though of an inferior quality as to whiteness, plasticity, &c. In the separation of the best clays, these pits require that the motion of the shear through them should be slow and equable, the shear of small size, and the launders should be tapped or cleared out once in every six or seven hours—a careful attention to which well repays any amount of labour in the production of a good article. That portion of the mica collected in the first of these launders often being mixed with its scales and crystals of hornblende, or diallage, is thrown aside as useless, while that collected in the others is generally sold as a second quality clay.

The clay water, having left the mica, now flows on to a large circular or oval collecting-pit, thirty or forty feet in circumference, and from six to ten feet deep, where the clay subsides, forming an under stratum of the consistence of cream, the supernatant water flowing off from the top of the pit until it is filled. As soon as this happens, the clay is allowed to pass out by a trap-hatch to the pans below it; or should there be none at this level, recourse is had to the pumps, by means of which, and attached launders, the clay is passed to the drying-pans in any portion of the work. Of these, there should be from ten to twelve, capable of holding from forty to fifty tons, to each large collecting pit; they have been made till lately on any part of the adjacent ground, frequently on that covering the clay bed, where the surface, after being levelled and covered with fine loose gravel, is hedged in by walls of granite, the joints of which, as well as those of the pits, are rendered impervious by interposed moss: they are generally from twenty to forty feet square, and two feet deep. The pans, when two-thirds filled with the clay, are thus exposed to the heat of the sun or the dry winds of March, to the aid of which alone the proprietors of the majority of these works have hitherto had recourse.

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## LIBRARIES IN THE UNITED STATES.

By a return made to Congress, it appears that there were, in 1851:

| | Number. | Volumes. |
|---|---|---|
| 1. State Libraries | 39 | 288,937 |
| 2. Social Libraries | 126 | 611,334 |
| 3. College Libraries | 126 | 586,912 |
| 4. Students' Libraries | 142 | 254,639 |
| 5. Libraries of Academies and Professional Schools | 227 | 320,909 |
| 6. Libraries of Scientific and Historical Societies | 34 | 138,901 |
| 7. Public School Libraries | 9,505 | 1,552,332 |
| Total | 10,199 | 3,753,964 |

1. *State Libraries* include those of general government, and of the educational departments, and those of the State Courts.—Almost all the States in the Union have organized State Libraries. Those which have not possess collections of books, which will, ere long, serve as the foundations of such Libraries. These Libraries are composed, to a great extent, of public documents of the general and State governments, with works on statistics, political economy, history, &c. Some of them, as the Library of Congress, the New York State Library, &c., take a much wider range, and are extremely valuable collections for general reference.

2. *Social Libraries* include Athenæums, Lyceums, Young Men's Associations, Mechanics' Institutions, Mercantile Libraries, &c.—These Libraries are generally composed of popular works for reading rather than for reference; but among them are many of the best collections in the country. We think that any one, looking over the catalogues of these Libraries, would be surprised and gratified to find them generally so well selected.

In some States almost every town has, under some name, a Social Library. Most of these collections, it is true, are very small, containing less than a thousand volumes; but there are doubtless a great many, far more considerable in size, which have been unintentionally overlooked.

3. *College Libraries* (exclusive of Student's Libraries).—These Colleges are mostly eleemosynary institutions. Their Libraries are frequently the chance aggregations of the gifts of charity; too many of them discarded, as well nigh worthless, from the shelves of the donors. This is not true of all our College Libraries; for among them are some very important collections, chosen with care and competent learning, purchased with economy, and guarded with prudence,—though ever available to those who wish to use them aright.

4. *Student's Libraries*, in Colleges, Professional Schools, Academies, &c.—The societies formed by students in these seminaries of learning, for mutual improvement in debate and composition, for the most part possess Libraries. These are generally useful collections of books of a popular character. Sometimes (in Yale College particularly) they are large, well selected, and admirably arranged and kept. Dust seldom gathers on the books in such collections.

5. *Libraries of Professional Schools* and *Incorporated Academies* include Theological Seminaries,

Law Schools, Medical Colleges, and Military Academies, as well as high schools, generally termed "Academies." The Professional Schools, several of them, possess the best special Libraries in the country. These Institutions (particularly the Theological) are so frequently connected with Academies, that it was found most convenient to group them together.

6. *Libraries of Learned Societies,*—Scientific, Literary, and Historical.—These Libraries are mostly composed of the transactions of similar societies and of periodicals, which contain the current records of science and letters. They have been mostly procured by donation and exchange. Some of the collections are extensive and important. The Historical Societies are doing great service in gathering and guarding the precious memorials of the early annals.

7. *Public School Libraries.*—Several of the States have taken great interest in supplying every township and school district with a Library. Other States have commenced such collections, and it is to be hoped that they may be greatly multiplied. They are not intended for pupils alone, but for all the population of the district or township to which they belong. They are composed of valuable books, designed and adapted to communicate useful knowledge in a popular way, and to cultivate all the higher elements of character. They are in continual use, and it is impossible to over estimate their beneficial influence.

Another class of Libraries, the statistics of which could not be collected readily, comprises Sunday-school Libraries. The aggregate number of books which they contain is very great. These books, though mostly for juvenile readers, are always of a moral or religious tendency, and they have vast influence in forming the intellectual as well as the moral character of the people.

## LIVERPOOL COLLEGIATE INSTITUTION.

Whilst public attention is eagerly turned to the subject of education, with a view to its extension among the masses, and whilst all branches of science are now being expounded in a popular and easy method, the study of the law can scarcely be said to have awakened from its inanimate state. One branch in particular, directly concerning individuals not connected with the profession, has never been taught in this country as a distinct system and in a practical method. *Commercial* law has long formed a subject of special instruction in Continental Universities. In Paris, professorships of mercantile law were established by Government as early as 1809; and there, and at the other Universities of France, advocates, magistrates, consuls, and vice-consuls are required to receive regular instruction in that branch of law. This portion of the law comprises not only the principles involved in all those multitudinous mercantile disputes which are adjudicated in the Common Law, Equity, and Admiralty Courts, but also those legislative enactments which have a bearing on, or directly affect, our commerce and shipping. It is easy to conceive how important it would be, therefore, to afford to the mercantile body increased facilities for acquiring a knowledge of a branch of law so nearly touching their interests, *and by means of which knowledge so many unnecessary disputes and litigations may be avoided.* The Council of the King's College, London, appreciating the wide interest expressed by the mercantile classes in the reform of our commercial law and judicial system, have taken the initiative in this matter by the appointment of Mr. Leone Levi, whose name is already so well known in association with the subject, to deliver, at the College, Lectures on the entire Mercantile Law of the United Kingdom, and of those countries with whom our commerce is carried on, the first course of which has just been concluded. Believing that the dissemination of a popular knowledge of the law, as bearing on mercantile pursuits, would be equally useful in the second commercial town of the empire, Mr. Leone Levi has undertaken to give at the Collegiate Institution, during the London recess, a Course of Lectures on Commercial Law. The merchants and traders of Liverpool, it is to be hoped, will afford their countenance to these efforts, by their own attendance, and more particularly by inducing the young men growing up under their eye in their offices to avail themselves of the opportunity.

## HOME CORRESPONDENCE.

### PATENTS.

LETTER IV.

Sir,—In my three previous letters I have been considering the principal, I believe I may say the only, arguments which are commonly relied on by the defenders of the patent laws. I shall now go on to state some of the objections to patents, though I have been obliged incidentally to mention most of them already, particularly that which is the most important of all, namely, that the monopoly granted to a patentee prevents everybody else from using the invention, though he may have invented it independently, and even previously, or may have found out uses for it far more extensive and valuable to the world than the patentee ever contemplated; and consequently that patents impede instead of advancing the progress of invention and science.

The instance which I mentioned in my first letter, because it was thrown in my way, of Watt's invention of the sun-and-planet-wheel motion as a substitute for the crank will do as well as any other of the multitude which might be chosen for an illustration of the effects of a patent on other inventors of the same or better things. As I said before, Watt was precluded from using the crank, which he had himself invented, in his steam-engines, because the monopoly of it had just before been snapped up by another inventor, who thereby got the means of requiring exorbitant terms for the use of it, proportioned not to the value which he himself had given it, but to the value which Watt had given it by his other inventions. The same as if a man had got a patent for the invention of paper just before printing was invented; and then, the moment printing came out, the value of the paper patent would have been increased beyond all calculation, without any merit whatever of his, and the value of printing so much lessened to the public, who would have to pay the increased cost of books in consequence of the paper patent, and all because the invention had not been made a few years earlier, in which case the patent would have run out, and paper would have been free to print upon. And this hypothetical case would be still stronger, and still more like the actual case of Watt's invention, if the inventor of printing had also himself invented paper independently of the man who had just before got a patent for it. But it is worth while to look into this affair of the crank and planet-wheels a little more in detail.

Everybody who is likely to read these letters knows what a crank is, and that the object of it is to convert the vibratory or reciprocating motion of a steam-engine into rotatory motion of the main axle of the machine which the steam-engine has to drive. But probably everybody does not know what the sun-and-planet wheels were, as they have long been obsolete, and I suppose have never been constructed since the expiration of the crank patent left mankind at liberty to convert reciprocating into rotatory motion in the most direct and simple way. Suppose a toothed wheel of any convenient size fixed on the main axis of the machine to be driven, and another wheel, also of any size, set fast on the connecting-rod of the steam-engine, so as to work into the other wheel. The fixed axis of the connecting rod wheel must be tied to the main axis by some kind of link or strap (which, in fact, will look just like a crank), so as to keep the teeth of the two wheels always engaged. Then as the connecting-rod with its fixed (planet) wheel moves up and down, it will evidently make the other (sun) wheel and the axis of the machine revolve as a crank does, only not with the same velocity; for it may be easily shown that if the two wheels are of the same size, the sun wheel will turn twice round for one oscillation of the rod; and if the planet-wheel is smaller than the sun, it will turn less than twice for one oscillation. For example, if the sun has ten times as many teeth as the planet, it will make eleven turns for one oscillation of the rod; and if the planet-wheel is reduced to a single tooth or pin, then the motion becomes exactly the same as that of a crank.

Now the following remarks may be made on this contrivance:

1. Comparing it with the simplicity of Watt's other invention—the crank—everybody must see that it is utterly clumsy and abominable.

2. Although professing to be different from the action of the crank, and being so to a sufficient extent to evade the patent, it may yet be made to approach infinitely near to it, by increasing the number of teeth of the sun-wheel in proportion to those of the planet.

3. We may be sure that Watt knew all this just as well as we do, when he patented it as a distinct method of getting rotatory motion; and that he would never have used it as a substitute for the crank if he had been at liberty to use which he liked.

4. Whatever time he spent upon inventing it was wasted; that is, it might have been spent more profitably in doing something else which would have been of use to the world; whereas this thing has been of none, except that of protecting them from the extortion of the crank-patentee while his patent lasted.

5. However much we may admire his ingenuity in making this "beautiful contrivance," as one of his biographers rather absurdly calls it, and however much we rejoiced (as probably everybody did when he first read the account of it) at his thus defeating his antagonist, we must see that it would be more properly designated a "beautiful dodge" for evading the operation of an unjust and mischievous law, which would otherwise have obstructed the fair use of his own most valuable inventions for the benefit of a man to whom he was indebted for nothing.

6. It might have happened that no such evasion of the crank was possible, or that he had not the luck to find it out in time, or that the man of cranks had monopolised every one of the avenues (and there are very few) leading from vibratory to rotatory motion; and then Watt and the public would have been at his mercy, and he would have made an enormous fortune out of another man's inventions, and at the expense of either Watt or the public, or both.

7. Seeing that Watt himself was quite capable of inventing, and did invent, the crank without this man's assistance, the patent granted to him was an unmitigated evil and nuisance to society, and only escaped being a much greater nuisance, and an instrument of gross injustice, because a trick was discovered for evading it.

If anybody is inclined to say that this is an isolated, or even an extraordinary case, instead of mentioning others, to every one of which the same answer would be given, I will refer him at once to something which he cannot gainsay quite so easily, viz., to that Report of the Jury on Philosophical Instruments in the Great Exhibition, which I alluded to before. And considering the nature of the articles in that class (X.), and that it was very nearly, if not quite, the largest in the Exhibition—that the Jury comprised some of the most eminent scientific men of all nations of the world, and I may add, the remarkable elaborateness of their report, relating the numerous experiments they made, and showing the care with which they examined everything submitted to them —I think no one will venture to say that their opinion on the subject of patents is not entitled to unusual weight; and certainly not the less so, because their chairman had previously appeared as an advocate of the cheapest possible patents. I am sorry that I have not now the means of quoting their exact words,* but I know their Report says that they had been much impressed with the number of inventions which evidently had no other object or use than to evade existing patents; and that they could not avoid coming to the conclusion that *patents are an obstruction to the progress of science.*

There is, however, another special instance which one can hardly help referring to, considering the importance which has lately been attached, and the encouragement which has been given by this Society, to the progress of the Photographic art—perhaps the greatest wonder of this age. None of your readers can have forgotten that, although (by some lucky accident) the original Daguerreotype process for producing sun-pictures on metal failed to be secured by patent, Mr. Fox Talbot's process for taking pictures on paper was patented; and that such was found to be the effect of the patent in impeding the progress of the art in this country, that he was memorialised by some of the leading men of science to give it up to the public: which he did, without any compensation, except the satisfaction of knowing that he was thereby contributing to the advance, instead of interposing an obstruction, of an important branch of science.

And this instance also affords a sufficient refutation of what is likely enough to be alleged by the patent advocates, viz., that the imposition of a small royalty, which would probably be an inconsiderable addition to the price, cannot seriously interfere with the use of any invention of real value. We are now able to reply that, like a great many other alleged impossibilities, this interference is a fact. If it were not, the unusual, and I should think, unprecedented step of asking a patentee to give up his rights without a farthing of compensation, would never have been taken, or responded to. If it were not a fact that people find it worth their while to take a great deal of trouble, and often to resort to worse expedients, for the purpose of evading a patent, we should not have had the philosophical jury expressing their astonishment at the number of ingenious devices which they found had been resorted to with the single object of getting rid of the arbitrary interference of a patentee, in whatever way it may be exercised.

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* "We cannot help recording how clearly the injurious effects of patent enrolments on science were shown in the course of our labours; many of the ingenious contrivances exhibited proved to be merely variations, for the avoidance of the infringement of patents. In many cases the subjects patented were of a very trifling nature, but still their effect was to shut up the path in that direction from further improvement. The great advance of photography, previously alluded to, and the perfection of the microscope, are chiefly due to the avoidance of patents in connection with their improvements." —*Jury Reports, p. 246; Mr. Glaisher's Report, Class X.*

I said the *arbitrary* interference of the patentee; for although in most cases he may find it his interest to take either a moderate royalty, or (if he is the manufacturer himself) a moderate excess of price beyond the usual profit, it must be remembered that he is not the least obliged to do so. And it is easy to conceive a case where it would be his interest, not merely to demand a very large royalty, such as the crank patentee might have demanded, but to refuse to let the thing be used at all. A man of large capital buys a patent of an inventor, by which he is able to manufacture and sell at a good profit some article of common use, say at half the usual price. What is to prevent him from refusing to let anybody else use the invention at any practicable price, and so engrossing to himself the whole trade in the article, and ruining everybody else who makes it? It is no answer to say that though the other manufacturers are ruined, the public are benefited by their reduction of the price; for the public would clearly be quite as well, and better off, if all the other manufacturers could use the new invention as well as the patentee. It is the invention, and not the patent, which benefits the public; and it is the patent, and not the invention, which enables the one man who has bought it up to ruin his competitors and raise the price higher than he could if there were no patents and no monopoly.

But this same arbitrary power of a patentee over the invention he has bought up enables him, if he pleases, to do a still worse thing, and that is to suppress the invention altogether; neither letting anybody else use it at any price, nor using it himself. I confess that I should not have ventured to suggest this as a creditable mode of using a patent, if instances of it had not been published as matters of fact, both by some of the witnesses before the Patent Committee in 1851, and in several of the Exhibition Jury Reports. One of the most flagrant of them that I remember was the buying up, by some type-founders, of a machine for making types cheaper, and the patent for it, and actually destroying the machine; I suppose for fear it should be seen, and suggest to anybody something else on the same principle, but just wide enough to clear the patent. Incredible as this kind of proceeding may appear to many persons, I am sorry to say I have no difficulty in believing it myself; nor will anybody who has had opportunities of observing the mere shopkeeping spirit of many of the people engaged even in what may be called scientific trades, and of their determined hatred of everything in the form of an invention which would involve them in any immediate expense, or disturb their everyday mode of doing business, or (as they think) make their goods too cheap. And yet I believe these people can generally read and write, which their predecessors and prototypes, who went about burning power-looms and threshing machines, could not. I doubt whether there is any trade to which these remarks can be more applicable than one which may be considered a peculiarly scientific trade, viz., clock-making. If it were not so, we should long ago have had clocks made here by machinery; and better, if not cheaper, than the American and French clocks, which are so made, instead of hearing the clockmakers perpetually complaining of the perverseness of the public in refusing to buy English clocks (many of which are no better), at six times the price of the American's. The late Mr. Dent used to say, that if he was ten years younger he would have done it himself; as indeed he had begun to do with turret-clocks, making better ones of cast iron than had ever before been made of brass.

And this practice of buying up patents to prevent competition, or interference with the established mode of doing business, is rather likely to increase than to diminish, as patents, like everything else, are getting more into the hands of joint-stock companies. Indeed so suspicious has the law apparently been of the danger of letting them get into such hands, that it requires an Act of Parliament to enable a company to hold a patent.* We know pretty well what railway companies will do to get rid of a competition; and patent companies are not likely to be more scrupulous. And when we find the chairman of the Electric Telegraph Company confessing—and that was two years ago—that they had bought up 132,000*l.*, worth of patents (if I remember right), some of which they had never used nor intended to use, it is not difficult to guess what a company possessed of a large and expensive stock of instruments or machinery would do with a patent which they thought likely to give them any trouble, if they could get hold of it. I need hardly add, that an invention suppressed by a patent is a great deal worse than an invention not yet made. For where it is not yet made, it may be made any day; but where it is made, patented, and suppressed, the man or the company who have bought it up are more certain than any other patentee to take very good care that nobody else uses it for fourteen years. This then is another way in which patents may be, and sometimes are, an unqualified evil to society, and a direct obstruction to the progress of the arts and sciences.

The stoppage of everybody who is travelling the road on which a patentee has been allowed to erect his toll-bar, either until he has paid the toll demanded, or for fourteen years absolutely, if it suits the patentee to shut up the road altogether, is also very much aggravated by the notorious fact, that inventions are generally made just when the world is ripe for them; that is to say, when science has arrived at the point at which such inventions are sure to spring up, and when several persons are at once on the point of discovering them. Hence the innumerable and proverbial contests about priority of invention, even when there is no patent to fight for. There were no less than four claimants for the application of the pendulum to clocks about 230 years ago, when inventors were not so numerous as they are now. Never, hardly, does a notice of anything appear in a newspaper as the invention of anybody, but you see, in a day or two, an indignant letter claiming it for somebody else, generally the writer; with a series of flat contradictions, and perhaps a few more claimants, which might go on *ad infinitum*, but for the opportune notice, after a few shots have been fired, that "all future communications must be treated as advertisements." The notion, therefore, of a patent monopoly being a fair, or proper, or necessary reward, or encouragement to the man who is far in advance of his age,—and not only invents for them what they are requiring, but shows them what they ought to require,—is founded on what is, in nine cases out of ten, a pure fiction. The man who gets the patent is, more likely than not, one of a considerable number, all on the same scent, and all of them very likely put on it by somebody else; and the one who, by greater luck, or boldness, or, if you like, cleverness, gets his scheme into shape for the Patent Office a little sooner than the rest. Quickness of action in this, as in most other things, no doubt ought to have its reward, and in one way or other is pretty sure to get it; but it by no means follows that it is necessary or expedient to distribute the rewards of science on the pinciples of the race-course or the lottery-wheel.

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* This is not so now, though it was formerly. There used to be a condition, making the patent void if it became the property of more than five persons, afterwards relaxed to twelve. By the existing law, there is no restriction whatever as to number of owners.—*Ed. Soc. Arts' Journal.*

I will end this letter with one more instance, to show how inadequate the patent system is to do justice, and to avoid injustice and absurdity. The readers of this Journal were edified a few months ago with a discussion about what is called the secondary compensation for chronometer balances. Well, there were no less than seven, and, I believe, more inventions made for that purpose within less than that number of years, and disclosed more or less publicly, and some of them patented and others not. Two of them were exactly the same, and the one of those two which was patented was so after the other had been, not indeed published, but shown to the Astronomer Royal. All of them are substantially on the same principle, and any one of them might very well have been suggested by any of the others, although, perhaps, some of them may be distinct enough for their patents to stand a trial. But although they are all on the same principle, I have reason to believe that they were nearly all *bonâ fide* independent inventions; and they very easily might be so, because the principle of the invention is perfectly obvious, and would occur to almost any clever man in the business, as soon as anybody had discovered and pointed out what the chronometers really wanted; and that discovery (like so many others) is just the thing which was not a matter of mechanical invention, but of scientific deduction from published documents, viz., the lists of the Greenwich trials, and therefore could not be patented. Instead of fighting about the patent rights, the chronometer-makers have all gone on using their own, each asserting that his own is the best; and, in fact, there is so little difference in their success, that this would be an additional source of injustice if any one of them had been able to interfere with the others.

Leaving your readers to make their own reflections on the various points suggested by this case, which I do not suppose is a singular one, I hope to conclude what I have to say against patents in one more letter, and remain, yours faithfully,

E. B. Denison,

Ben-Rhydding, Leeds,
5th September.

## PATENTS.

Sir,—Notwithstanding Mr. Denison's long and ingenious arguments against patents, I submit that he has left the very gist of the question untouched. Invention proceeds from knowledge and labour, requiring much in some cases, and little in others; but in all cases a certain amount. It is the policy of all civilised states to recognise the result of a man's labour as his property. Why is inventive labour to be an exception? unless it can be proved that invention is hurtful to mankind, which I feel sure Mr. Denison will not maintain. The inventor ought to be protected from robbery just as much as any other man is protected by civilised communities in the fruits of his labour. For special and good reasons he obtains only a limited protection; but all jurists of any eminence, who have thought or written on the subject say, that it is right policy to allow this limited protection. Jeremy Bentham, John Stuart Mill, and M'Culloch are not likely to be the advocates of rights injurious to communities. Allow me to ask Mr. Denison to discuss the following opinions of theirs, and to prove the fallacy of them:

Jeremy Bentham says:

"There is one species of privilege certainly very advantageous: the patents which are granted in England for a limited time, for inventions in arts and manufactures. Of all the methods of exciting and rewarding industry, this is the least burthensome, and the most exactly proportioned to the merit of the invention. This privilege has nothing in common with monopolies, which are so justly decried. . . . . With respect to a great number of inventions in the arts, an exclusive privilege is absolutely necessary, in order that what is sown may be reaped. In new inventions, protection against imitators is not less necessary than in established manufactures protection against thieves. He who has no hope that he shall reap will not take the trouble to sow. But that which one man has invented all the world can imitate. Without the assistance of the laws, the inventor would almost always be driven out of market by his rival, who finding himself, without any expense, in possession of a discovery which has cost the inventor much time and expense, would be able to deprive him of all his deserved advantages, by selling at a lower price. An exclusive privilege is of all rewards the best proportioned, the most natural, and the least burthensome. It produces an infinite effect, and costs nothing. 'Grant me fifteen years,' says the inventor, 'that I may reap the fruit of my labours; after this term it shall be enjoyed by all the world.' Does the sovereign say, 'No, you shall not have it,' what will happen? It will be enjoyed by no one, neither for fifteen years nor afterwards; everybody will be disappointed—inventors, workmen, consumers; everything will be stifled, both benefit and enjoyment."

John Stuart Mill, in his "Principles of Political Economy," is very explicit:

"The condemnation of MONOPOLIES ought not to extend to patents, by which the originator of an improved process is permitted to enjoy, for a limited period, the exclusive privilege of using his own improvement. This is not making the commodity dear for his benefit, but merely postponing a part of the increased cheapness which the public owe to the inventor, in order to compensate and reward him for the service. That he ought to be both compensated and rewarded for it will not be denied, and also that if all were at once allowed to avail themselves of his ingenuity, without having shared the labours or the expenses which he had to incur in bringing his idea into a practical shape, either such expenses and labours would be undergone by nobody except very opulent and very public-spirited persons, or the state must put a value on the service rendered by an inventor, and make him a pecuniary grant. This has been done in some instances, and may be done without inconvenience in cases of very conspicuous public benefit; but in general an exclusive privilege of temporary duration is preferable, because it leaves nothing to any one's discretion; because the reward conferred by it depends upon the inventions being found useful, and the greater the usefulness the greater the reward: and because it is paid by the very persons to whom the service is rendered—the consumers of the commodity. So decisive, indeed, are these considerations, that if the system of patents were abandoned for that of rewards by the state, the best shape which these could assume would be that of a small temporary tax, imposed for the inventor's benefit, on all persons making use of the inventions. No limit can be set to the importance even in a purely productive and material point of view of mere thought. . . . Intellectual speculation must be looked upon as a most influential part of the productive labour of society."

Mr. M'Culloch says:

"The expediency of granting patents has been disputed, though, as it would seem, without any sufficient reason. Were they refused, the inducement to make discoveries would in many cases be very much weakened; at the same time that it would plainly be for the interest of every one who made a discovery to endeavour, if possible, to conceal it. And notwithstanding the difficulties in the way of concealment, they are not insuperable; and it is believed that several important inventions have been lost from the secret dying with their authors."—*Commercial Dictionary.*

I hope Mr. Denison will give the members of the Society an opportunity of having a full discussion on the policy of granting patents in the next Session, and then we will try and show that what is the practice of almost every modern civilised community, and the theory of the most distinguished jurists, is right.

Your obedient Servant,

Henry Cole.

## OCEAN NAVIGATION.

Sir,—In perusing the number of your Journal for August 19th, I was struck with the opinions arrived at by our American friends of our great Exhibition, and of their share in it; and although I think that there can be no one, of any nation, who knows anything of the matter, who could be misled by the concluding sentences of your extracts, yet the same remark may not hold good as to two articles which, singularly enough, appear in juxtaposition in your last number—those upon "Ship Building," and "Improved Ocean Navigation"—as it is my opinion that the second is more dependent on the first than upon itself for the progress we have lately witnessed in maritime affairs.

Having carefully examined the "Improved Sailing Directions," issued from the Hydrographic Bureau of the United States, I think that the proposition stated in that work cannot be well sustained—that it "contains the notice of sixteen actual discoveries, and twelve probable discoveries in hydrographical science." I repeat, that others have suggested or demonstrated, in many or most instances, what is there confirmed or amplified: nor do I think that the absolute benefits to navigation have as yet been very evident from their application. Indeed, it is stated in the work itself that the proposed new routes between Europe and North America have not been attended with the anticipated success; but this might have been predicted, as the region is so well traversed, and its nature so well ascertained. The route advocated from New York to Cape San Roque might have been recommended from pre-existing data, and therefore the advantage gained of reducing the passage to the equator from an average of forty-one days to twenty-four days, ought not to be entirely attributed to that source. Perhaps the circuitous route formerly followed, leading three times across the ocean, might have been derived from the Americans following European sailing directions, as those hitherto in use among the American marine are almost exclusive (but unacknowledged) transcripts of English works.

But while I would accord every meed of praise to the great energy and talent of the worthy American officer who originated this investigation of maritime phenomena, I have that "jealousy of good works" which would claim for others, and for our own nation, that merit to which it is entitled. It must be observed that the American observations are mainly confined to the Atlantic; but the conclusions arrived at are the same as those propounded by Dr. Young, Halley, Basil Hall, and others, as respects atmospheric circulation, but certainly they are more exactly stated. And on the subject of currents, the laborious and important "Investigation of the currents of the Atlantic," the result of the personal and unassisted labour of Major Rennell, still contains nearly all that we know of the matter. Other names might be included in this claim; one other, well known to the Society of Arts, deserves signal attention—that of Sir William Reid, the author of the "Law of Storms," to whom, although he did not stand alone in this good work, (Mr. W. C. Redfield, of New York, and others, joining with him,) a debt of gratitude of no ordinary kind is due, and also to the last-named gentleman. These are topics included among many others, which, without consideration, might be supposed to have originated entirely with the present American inquiry; but the United States were not the first to enter on this field of research: our knowledge of the winds and currents of the Atlantic were placed nearly on their present basis by the previous labours of Rennell and others.

The real harvest is to come. The Indian Ocean, and especially the Oriental Archipelago, is an untried field, although growing into daily and vast importance. The phenomena of the Pacific, too, is almost unknown; and it is to be hoped that mariners of every nation will cordially co-operate with each other in collecting and disseminating useful knowledge, and I doubt not but that we shall not be last in this honourable rivalry.

But the arrangement of this is the work of the Government, not of the individual; and I sincerely trust that our Admiralty may establish such an office, or branch of their own department, as may shortly supply the requirements of the day, as there must be abundant information, almost sufficing to draw up a perfect system, now buried in its archives.

Now, with respect to the other topic—that of ship-building. If ships—as the *Sovereign of the Seas*, or the *Flying Cloud* have done—can make good 433 and 419 statute miles per day, or 5,391 nautical miles in 22 days, they are sure to make extraordinary passages, totally irrespective of any improved sailing directions; and here we have the true secret of the improvement: and I think with your correspondent, "A Member," that it is an excellent field for the Society to enter upon—to gather together facts and data whereon to found opinions as to the best form and capabilities of ships.

I would also remark, that some of the finest of these clipper ships are not American, but English colonial ships, constructed by British skill; and that we may look forward to a new era in the ship-building of our own country, as there is in that of the United States.

I am, Sir, yours obediently,

Æolus.

## SHIP-BUILDING.

Sir,—The intentions of the writer, in his letter on this subject, inserted in your Journal (No. 40), are excellent; but unfortunately his suggestion of offering a premium, or reward, for improvements in this art cannot be carried out with any hope of success. Even a premium of a few thousands would be nothing when compared with the vast capitals employed in ship-building; and besides, no gentlemen in a large way of business would ever think of entering into a competition suitable only to young beginners.

The art of ship-building requires no treatises or other fostering care to bring it forward; it is no weak or sickly child; all it requires is to be let alone. That, however, is not the case at present; and no material improvement can take place in the hulls of our merchantmen so long as the legal measurement of tonnage remains as it is.

Under the present tonnage laws, all the practical knowledge, skill, and ingenuity of our shipwrights is absorbed in the endeavour to produce a shapely hull, which shall be *flattened in* wherever the surveyor's measurement is taken, and *swelled out* wherever it is not. The system carries absurdity on the face of it, and cannot even pretend to the slightest approach to accuracy; for a vessel could be built so as to carry either double or only one half of her legal tonnage, and yet her legal tonnage is given to the one-hundredth part of a ton, or less than a quarter of a cwt. A racing yacht will even carry nothing; because if relieved of part of her ballast, and her ample saloons were filled with merchandise, her sailing trim would be bottom-upwards.

All obstacles to improvement in naval architecture will vanish whenever the register tonnage shall be the weight of sea-water displaced by sinking the vessel from light to load water lines, which are fixed and determined by the shipwright when the draft is made, and he might be required to give an attested document on delivering the ship, to be added to, or inserted in the ship's papers, showing her true displacement in tons and hundredths of a ton.

Yacht-building is called the nursery of naval architecture, but it is not so, at least to any appreciable extent, because no one rule followed by the racing yacht builder would be of any avail in the construction of vessels intended for ordinary purposes. Moreover, besides the adoption of the old tonnage laws, the racing clubs have established such rules and regulations as are calculated to give the slowest as well as the fastest sailer an almost equal chance of winning the cup, and they do not exclude any amount of jockey ship compatible with club honour; so that if the experiment were tried of changing the crews of two yachts, the loser would become the winner, and *vice versâ*.

If racing yacht clubs have any intention of testing the true sailing powers of their vessels, they should distinguish the classes by one single linear measurement only, say length of keel or length over all, and leave out of the question all matters relating either to tonnage or rig. Then indeed yacht-building would be truly the nursery of naval architecture. One of the swift *Tartunas* or *Schiabeccos* of the Mediterranean would beat the fastest English yacht, but she could not run a match, because she would be out of all rule and order with the yacht clubs. I remain, Sir,

Your obedient Servant,

Poole, Sept. 2nd, 1853. HENRY W. REVELEY.

## LECTURE LIST.

Poole, August 31st, 1853.

SIR,—In your Journal of the 26th instant, a contributor, under the signature of a "Labouring Man," offers his testimony to the valuable assistance afforded to Institutions by the publication of your Lecture List, regretting at the same time that so small a number of Institutions had filled up and returned your schedules, thereby rendering the list less comprehensive and effectual than it otherwise might have been. Now, Sir, both in his admission of utility and regret for its restricted character, I perfectly coincide with the writer; but, unfortunately, I am in a position to do more than this; I can not only regret that so small a number of Institutions should have availed themselves of the proffered advantages, but I can suggest to your correspondent *the reason* which has conduced, and will still continue to conduce, to this apparent blindness, unless members of Institutions will individually become more active in the services of the society to which they belong, than has been hitherto found to be the case. To the members of an Institution, the Union with the Society of Arts, or with any other Society, may appear a very easy and simple matter; but let them apply to their Secretary, and they will find that to him it is attended with a great increase of his already tolerably voluminous correspondence, almost sufficient of itself to constitute an occupation. Members individually, or Institutions as a body, are ready enough to avail themselves of any advantage of this kind; but before it will be *possible* for them to do so to any extent, they must find some machinery capable of conducting the correspondence, without throwing the whole onus on an Honorary Secretary, who having, in most cases, business of his own to attend, cannot (however he may wish so to do) devote sufficient time and attention to the object.

In conclusion, I beg to express the gratification I felt on perusing the "List of Lecturers and their Subjects," the publication of which cannot fail to be productive, and to materially assist the Committees of Institutions in their selection of Lecturers.

I am, Sir, yours faithfully,

J. B. BLOOMFIELD, Hon. Secretary.

Town and County Library and Literary Institute.

## PROCEEDINGS OF INSTITUTIONS.

NORTHERN UNION.—The Annual Meeting of the Northern Union of Mechanics' Institutions was held on the 24th ultimo, at Hexham, on which occasion delegates attended from Newcastle, South Shields, Hexham, Blaydon, Corbridge, &c. In the absence (owing to illness) of W. B. Beaumont, Esq., M.P., the chair was taken by Philip Henry Howard, Esq. The Secretary read a Report, from which it appeared that the number of Institutions included in the Union amounted to twenty-eight, and numbered 2,192 members; and possessed libraries to the extent of 23,498 volumes. The gross income of the Institutions in Union amounted to 846*l*. The Report referred to the proposed free distribution of Parliamentary papers, to the advertisement and paper duties, also to the usefulness of the itinerating library connected with the Union, and recommended the formation of sub-Unions and local museums. The efforts of the Society of Arts to extend the usefulness of Mechanics' Institutions were referred to, and the Report concluded with a strong expression on the part of the Committee of the eminent services rendered by Mr. Grant, the lecturer to the Union. The Report having been adopted, Mr. Matthew Hutchinson, on behalf of the Mechanics' Institution, South Shields, invited the Union to meet in that town in 1834. The officers for the next year were then elected, and the usual votes to the retiring officers passed, after which the members dined together, when the Chair was taken by Mr. Howard, and the Vice-Chair by Mr. Sopwith.

WANDSWORTH LITERARY AND SCIENTIFIC INSTITUTION.—This Institution has started a Monthly Journal, and has just issued its first Number. Its object is stated to afford a more ready communication with the members, increasing from year to year, and many of whom are unable to attend the lectures, &c. The Journal is intended to contain a brief review of the proceedings of the Institution occurring the previous month, as well as a notice of those to come. "As in every community," says the opening article of the Journal, "it is most important that all demands and offers of supply should be readily made public, and that the wants of all classes should be most speedily made known to each other, we purpose to unite with our Journal an advertising sheet, which, in the opinion of many individuals who have been long resident in the place, is much wanted. We have indeed to thank the legislature for those recent acts, which will enable us to undertake the insertion of advertisements at a very low rate; and, we trust, lessen to a considerable extent the expenses of the Journal. As this work will emanate from a committee the majority of whom are *working men*, we hope our readers will not pass a too severe criticism upon our endeavours: our earnest wish being to fulfil (as far as our capacities will permit us), the duties of a committee of an Educational Institution."

## MISCELLANEA.

LIGHTNING CONDUCTORS.—The Government have granted Sir William Snow Harris a sum of 5,000*l.*, for perfecting a mode of applying lightning conductors on board ships.

THE SOAP PLANT.—The Vienna journals announce that a firm of California has sent home to that city some seeds of the soap plant. It grows wild in California, rising to the height of about a foot. The plant fades away in the month of May, and inside each is a ball of natural soap, superior, it is assured, to any that can be manufactured.

MACHINE FOR BORING ROCKS.—Mr. E. Talbot has patented a method of boring rocks, consisting of an apparatus, in which a series of cutters, or chisels, are caused to cut out segments of circles from the centre to the periphery of the opening to be excavated, and by a continuous succession of instruments the whole of the rock is cut away.

ARTIFICIAL STONE.—Messrs. Julius Horing and Ludwig Suess, of New Jersey, have patented a process for the formation of artificial stone, in which they employ a compound of silex, alumina, and chloride of sodium. The mixture not only can be manufactured into blocks of artificial stone, but can be applied as a glaze to pottery wares.

IMPROVED PENHOLDER.—Mr. James Goodfellow has invented a new penholder, in which the pen is held by a small cylinder, which moves easily in a tube, the cylinder being kept in its position by a light coiled spring within the tube. This spring gives the pen a great deal of flexibility, and prevents the point from entering the paper when writing with rapidity.—*Journ. Roy. Corn. Poly. Society.*

CRAYON FOR WRITING ON GLASS.—M. Brunquell prepares a crayon for writing on glass so as to enable the contents of glass vessels to be inscribed on them at once. He takes four parts of spermaceti (stearine), three parts of tallow, and two parts of wax, and melts them in a cup; six parts of minium and one part of potash are then stirred into it, and the whole is kept warm for half an hour, and then poured into glass tubes of the thickness of a lead pencil. After quickly cooling, the mass may be screwed up and down in the tube, and cut to a fine point with a knife. This crayon will readily write on clean, dry glass.—*Dingler's Polytechnic Journal.*

COTTON ROPES FOR SHIPS, AND COTTON NETS.—There is a novelty about the *Sovereign of the Seas* that doubtless will be soon imitated by other vessels. The ropes which form the running rigging are of cotton, which we understand is not only capable of a lighter twist, but is not liable to become deteriorated by friction in the same degree as hempen cords. After they have been in use too for years, they can be sold for nearly as much as the original cost. These ropes are quite smooth, and run with great rapidity through the blocks. The sails also of this vessel are of cotton, two sets of cotton sails costing only the sum paid for one set of linen. Fishing nets made of cotton are much used in America.

GASOMETERS.—Some few years ago, several of the most "eminent engineers" of the day gave evidence before a Parliamentary Committee to the effect that a gasometer of greater diameter than 35 feet would be dangerous, and recommended that in all cases where this limit was approached, a series of strong walls should be built round the gas-holder in order to lessen the injury which the almost "inevitable" explosion might entail. One has lately been manufactured at Smethwick of 165 feet diameter. The gas-holder of the Philadelphia Gas-works, erected in 1850, is 140 feet diameter, and 74 feet high, and one now erecting there will be 160 feet diameter and 90 feet high, with a top nearly flat, having only rise enough to carry off the water, without the usual framing and rafters for sustaining the crown. —*Jour. Franklin Inst.*

BOOKS TO PRINCE EDWARD ISLAND.—"The Lords of Her Majesty's Treasury having authorised, by warrant, the extension to Prince Edward Island, of the reduced rates of postage, and the regulations recently established for books transmitted by the post to the British Colonies in the West Indies, &c., all printed books, magazines, reviews, and pamphlets (whether British, Colonial, or Foreign), may be sent, on and from the 1st September, by the post between the United Kingdom and Prince Edward Island, at the usual reduced rates of postage. This does not extend to or interfere with the transmission of printed votes and proceedings of Parliament, or of printed papers allowed to pass by the post under the newspaper privilege, all of which will continue subject to the existing regulations.

AFRICAN PRODUCE.—A sale lately took place, in Manchester, of various articles recently imported from Africa. There were twenty bags of cotton, of native growth, and 124 boxes of arrowroot, weighing about fifty pounds each box. Very different opinions have been expressed respecting the quality of the arrowroot by competent judges of other descriptions; but it is understood, from those who have made special trial of it, that its quality is very good, and that a connoisseur could scarcely distinguish it, in taste, from Bermuda arrowroot, which is admitted to be the best. All the 124 boxes found buyers, passing into thirteen or fourteen hands, at 7*d.* per lb., which is a price only reached by superior descriptions. Several parcels of Cayenne pepper passed into four hands, at 1*s.* per lb., which is considered to be somewhat under its value. Of the twenty bags of cotton offered, five were respectively of different colour and quality, and each bag was therefore submitted as a separate lot. The lowest quality fetched 4*d.* per lb., the second sold for 5¾*d.*, for the third 6¾*d.* was obtained, and for the best 7*d.* was given. The remaining fifteen bags went off at 6½*d.* per lb. The cotton is considered to have fetched a fair price, and such as will encourage the natives in its more extensive cultivation.

THE NEW LAW ON THE SMOKE NUISANCE IN THE METROPOLIS.—The new Act to abate the smoke nuisance in the Metropolis has just been printed. There are eight sections in the new law, and it enacts that from and after the 1st of August next furnaces in the Metropolis shall consume their own smoke, under penalties laid down. The Act extends to any mill, factory, printing-house, dye-house, iron-foundry, glass-house, distillery, brewhouse, sugar refinery, bakehouse, gasworks, waterworks, or other buildings used for the purpose of trade or manufactures, within the Metropolis. From the same day steam-vessels on the Thames above London-bridge are to consume their own smoke, under penalties to be recovered in a summary manner before a magistrate. The words, "consume of burn the smoke," are not to be held in all cases to mean, "to consume or burn *all* the smoke;" and the justices before whom any persons shall be summoned may remit the penalties if they are of opinion that such person has so constructed or altered his furnace as to consume or burn, as far as possible, all the smoke arising from it, and has carefully attended to the same. Constables may be empowered to enter and inspect furnaces and steam-engines. No information is to be laid under this Act to recover any penalty, except by the authority of the Secretary of State, or the Commissioners of the Metropolitan or City of London police.

## TO CORRESPONDENTS.

*Notice.*—Members, and others, who can furnish or obtain original information or suggestions on the subjects included in the Society's Premium-list, or other topics connected with the Society's various departments of operation, are invited to communicate the same to the Secretary, in as condensed a form as possible, for the purpose of being either read and discussed at the evening meetings, or inserted in the Society's weekly Journal. Anonymous letters cannot be attended to. All communications, whether the author's name is to appear or not, must be accompanied by the writer's name and address.

Members of the Society who do not receive the JOURNAL regularly, are requested to give immediate notice to the Secretary; and, in order to prevent mistakes, they are particularly requested to signify any change which they desire to have made in their address, with as little delay as possible.

*Country Institutions.*—Correspondents who are so good as to send reports of proceedings of Local Institutions, are requested to forward them immediately after the Meeting to which they refer, and not later than Tuesday morning, if intended for insertion in the following Friday's Journal.

## PATENT LAW AMENDMENT ACT, 1852.

### APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

### *From Gazette, 2nd September,* 1853.

*Dated 1st August,* 1853.

1788. J. Smeeton, Limehouse, Middlesex—Tablets and dial-plates, showing distances, and for barometers, &c.

*Dated 2nd August.*

1804. W. H. Clarke, 20, Great Marlborough-street—Composition resembling papier maché, &c. (A communication.)

*Dated 6th August.*

1842. H. Southam, Gloucester—Ploughs.

*Dated 16th August.*

1912. J. Stewart, St. Paul's-road, Camden-square—Pianofortes.
1914. E. Finch, Bridge Works, Chepstow, and C. Lamport, Workington—Ships' masts and rigging.
1916. J. Atherton, Preston, and J. Abbott, Accrington—Winding-machines.
1918. G. Richardson, Eastern Counties' Railway, Shoreditch—Railway signals.
1920. A. V. Newton, 66, Chancery-lane—Distillation of resin-oil. (A communication.)

*Dated 17th August.*

1921. J. Heritage, Warwick—Bricks, tiles, &c.
1922. S. Perkes, 1, Walbrook—Construction of cocks, &c. (A communication.)
1924. T. C. Ogden and Wm. Gibson, Manchester—Machinery for preparing, &c., flax, &c.
1925. T. Kirkwood, Edinburgh—Ventilation.
1927. G. L. Fuller, 13, St. Mary's-road, Peckham — Steam-engines.
1928. J. H. Mortimer, 1, Chester-place, Old Kent-road—Lamps.

*Dated 18th August.*

1929. R. Clough, Liverpool—Construction of ships.
1930. D. Chalmers, Manchester—Cutting the pile of woven fabrics.
1931. D. Harkes, Mere, Cheshire—Mowing and reaping apparatus.
1932. A. Pigé, Greek-street, Soho—Locks and keys. (A communication.)
1933. W. Symes, Pimlico—Fruit-cleaning machine.
1934. J. Larmanjat, 16, Castle-street, Holborn—Motive-power.
1935. P. Fairbairn, Leeds—Heckling-machines.
1936. W. Curtain, Retreat-place, Homerton — Machinery for printing textile fabrics, &c.
1937. W. Cornelius, Panton-street, Haymarket—Gilding porcelain, &c. (A communication.)
1938. A. M. M. de Bergevin, Paris—Manufacture of coke. (A communication.)
1939. T. Hughes, Birmingham — Improvements in writing-slates, &c.

*Dated 19th August.*

1940. F. W. A. de Fabeck, 6, Portland-road—Construction of viaducts, &c.
1941. A. Lutwyche, Birmingham—Steel and metallic pens.
1942. C. Watt, Selwood-place, Old Brompton, and H. Burgess, 7, Percy-street, Bedford-square—Preparing vegetable substances.
1943. G. Heyes, Bolton—Looms.

*Dated 20th August.*

1944. J. Kimberley, Birmingham—Raising and lowering window-blinds, &c.
1946. J. B. Polaillon and F. Maillard, Lyons—Starch.
1947. R. M. Sievier, Louviers, France, and Manchester—Machinery for manufacture of terry, &c.

*Dated 22nd August.*

1951. S. Lomas, Manchester—A silk-cleaner.
1953. A. E. L. Bellford, 16, Castle-street, Holborn — Manufacture of mineral oils and paraffine. (A communication.)
1955. F. Osbourn, Albion-street, King's-cross—Machinery for cutting woven fabrics.

*Dated 23rd August.*

1957. W. Brown, Glasgow—Obtaining volatile products from bituminous substances.
1959. J. Webster, Leicester—Pressure guages.
1961. W. Rettie, Aberdeen—Submarine lamp.
1963. J. Whiteley, Stapleford, Notts—Warp machinery.
1965. W. M'Leish, Battersea—Machine for destroying weeds.

## WEEKLY LIST OF PATENTS SEALED.

*Sealed 1st September,* 1853.

511. Edward Charlesworth, of York—Improvements in bill or letter-holders.
521. John Smith, of Upper Fountain-place, City-road, William Henry Smith, of the same place, and Alexander Williams, of Seething-lane—Improvements in metallic plates, and in producing devices or ornamental patterns thereon, and in the apparatus and machinery to be used for such purposes.
550. Henry M'Envoy, of Birmingham — Improvements in covered buttons.
554. Mary Ann Smith, of Wimpole-street—Improvements in the manufacture of toys, models, and other like articles of ornament or utility.
556. Baldwin Fulford Weatherdon, of Chancery-lane, and Charles Dealtry, of Guernsey—Improvements in the construction of certain floating vessels, and in the mode of propelling them.
557. Thomas Wells Cross, of Hunslet—Portable fire-engine.
558. William Todd, of Rochdale—Improvements in steam-engines.
560. Richard Archibald Brooman, of Fleet-street—Improvements in machinery for making pipes and tubes. (A communication.)
563. William Barrington, of Mallow—Improvement in life-boats.
567. Jacques François Dupont de Bussac, of King's-road, Chelsea—Improvements in paving and covering places. (A communication.)
571. Thomas Weatherburn Dodds, of Rotherham—Improvements in the treatment and manufacture of iron and steel.
572. Charles Parker, of Dundee—Improvements in weaving.
574. Thomas Weatherburn Dodds, of Rotherham—Improvements in the manufacture of wheels and axles.
577. John Hall and John Crofts, both of Birmingham—An improvement or improvements in revolving or repeating fire-arms.
603. Henry Ransford, of Chelsea—Improvements in the manufacture of starch.
577. James Summers, of West Cowes—Improvements in certain kinds of sails.
621. William Muir, of Manchester—Improvements in machinery or apparatus for grinding edge-tools and other articles.
634. William Edwards Staite, of Manchester—Improvements in apparatus for producing and applying current electricity, parts of which apparatus are applicable for obtaining and treating certain chemical products resulting from electrotype action.
641. William Bashall, jun., of Preston, Lancashire—Improvements in dressing, sizing, and tape-machines.
653. Henry Richardson Fanshawe, of Arthur-street, Old Kent-road—Improvements in fire-arms.
680. John Eldridge, of Stanley-street, Pimlico—Invention for washing woollen, linen, cotton, silken, hempen, skin, and flaxen materials and substances, and called the "Rotary Washing-machine."
696. John Stather, of Kingston-upon-Hull—Improvements in printing.
710. William Mann Crossland, of Beaumont-street—Improvements in block-making machinery.
819. Thomas Carr, of Chowbent—Improvements in nails and other fastenings, and in the machinery or apparatus employed in the manufacture thereof.
946. Thomas Day, of Birmingham — Improvement in the manufacture of boots and shoes, whereby great ease is secured to the wearer.
1139. Peter Wright, of Dudley—Improvements in the construction or manufacture of tew-irons.
1475. Christopher Wand, Edward Wand, and William Busfield, all of Bradford, Yorkshire—Improvements in preparing wool and other fibrous substances.
1557. George French, of Bandon, Ireland—Improvements in axles or axletrees.
1625. Louis Cornides, of Trafalgar-square—Improvements in treating certain ores and minerals, for the purpose of obtaining products therefrom.
1638. Henry Hoskyn Peppin, of New Bond-street—Improved joint for umbrella and parasol-sticks. (A communication.)
1646. Peter Fairbairn, of Leeds — Improved machinery for heckling flax, hemp, China grass, and other fibrous materials.

## WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

| Date of Registration. | No. in the Register. | Title. | Proprietor's Name. | Address. |
|---|---|---|---|---|
| Sept. 3 | 3506 | Dandy-roller, for the manufacture of paper. | T. H. and G. F. Busbridge | East Malling, Kent. |
| " 6 | 3507 | An Economic Letter-balance | John Shelden | 55, Great Hampton-street, Birmingham. |